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Building & Highway Material Testing Laboratory
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Job No: CTCE/BBMP/W.No.04/KRIDL/BM/Shape.T/2015-16 : 19.10.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP,
Agency	: **Technical Manager (West),** KRIDL, Bangalore.
Name of Work	: Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	: BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Bituminious Macadum
Date of Testing	: 19.10.2015

Civil-Tech Consultants & Engineers Bangalore

Flakiness Index = **11.60%**

Elongation Index = **13.20%**

Result : Combined Flakiness & Elongation index **24.80%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Macadam is 30%

Note:

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Job No: CTCE/BBMP/W.No.04/KRIDL/BM/Stripping/2015-16

20.10.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Type of Mix	Bituminous Macadam
Date of Testing	20.10.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Macadam is 95%

Note:

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Job No: CTCE/BBMP/W.No.04/KRIDL/BM/Sp_Wa/2015-16

20.10.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Source / Location	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	20.10.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 2	
1	Weight of aggregate suspended in water with the basket	W_1 g	2007	2005	2004	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1257	1255	1254	
4	Weight of saturated surface dry aggregate in air	W_3 g	2005	2003	2002	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	748	748	
6	Weight of oven dried aggregate	W_4 g	1994	1995	1996	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.666	2.667	2.668	2.667
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.706	2.696	2.690	2.698
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.55%	0.40%	0.30%	0.43%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Macadam is 2.0%

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Job No: CTCE/BBMP/W.No.04/KRIDL/BM/Agg.G/2015-16

20.10.2015

Aggregate Gradation Test
IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Sample ID	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	20.10.2015

Total Weight of Sample: 5150 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	370	7.18	7.18	92.82	90-100	
13.2	1655	32.14	39.32	60.68	56-88	
4.75	1425	27.67	66.99	33.01	16-36	
2.36	1030	20.00	86.99	13.01	4-19	
0.3	375	7.28	94.27	5.73	2-10	
0.075	110	2.14	96.41	3.59	0-8	

Total Weight of Sample: 5200 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	320	6.15	6.15	93.85	90-100	
13.2	1590	30.58	36.73	63.27	56-88	
4.75	1515	29.13	65.87	34.13	16-36	
2.36	960	18.46	84.33	15.67	4-19	
0.3	450	8.65	92.98	7.02	2-10	
0.075	165	3.17	96.15	3.85	0-8	

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T-2377

Job No: CTCE/BBMP/W.No.04/KRIDL/CSR-10/965n/SDBC(QB)/2015-16

19.10.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
*AGENCY	:	**Technical Manager (West),** KRIDL, Bangalore.
*NAME OF THE WORK	:	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
REFERENCE	:	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	17.10.2015
PERIOD OF TESTING	:	19.10.2015

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	88	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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AE W-4

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VIDYARANI P.K.
Technical Manager

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Job No.: CTCE/BBMP/W.No.04/KRIDL/SDBC/AIV/2015-16

19.10.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	19.10.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	386	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	82	83	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	303	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.30	21.50	21.40

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

Note:

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AE 2-A

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19.10.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of Work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	19.10.2015

Result : Flakiness Index = **12.35%**

Elongation Index = **13.60%**

Result : Combined Flakiness & Elongation index **25.95%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.04/KRIDL/SDBC/Stripping/2015-16

21.10.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	21.10.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	2.9	3.17	96.83
2	3.2		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.04/KRIDL/SDBC/Sp_Wa/2015-16

21.10.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	21.10.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2005	2004	2006	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1255	1254	1256	
4	Weight of saturated surface dry aggregate in air	W_3 g	2003	2008	2007	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	754	751	
6	Weight of oven dried aggregate	W_4 g	1993	1994	1998	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.664	2.645	2.660	2.656
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.701	2.695	2.693	2.696
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.50%	0.70%	0.45%	0.55%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.04/KRIDL/SDBC/AGG/2015-16 21.10.2015

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements to drain and asphalting to Someshwara temple 3rd B main cross roads in Ward No.04, BBMP, Bangalore.
Reference	BBMP/AEE/YNSD/W.O/ /2015-16 Dated: 05.10.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	21.10.2015

Total Weight of Sample: 5600 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	420	7.5	7.50	92.50	90-100	
4.75	2930	52.3	59.82	40.18	35-51	
2.36	780	13.9	73.75	26.25	24-39	
1.18	460	8.2	81.96	18.04	15-30	
0.3	325	5.8	87.77	12.23	9-19	
0.075	325	5.8	93.57	6.43	3-8	

Total Weight of Sample: 5700 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	405	7.1	7.11	92.89	90-100	
4.75	3105	54.5	61.58	38.42	35-51	
2.36	655	11.5	73.07	26.93	24-39	
1.18	485	8.5	81.58	18.42	15-30	
0.3	325	5.7	87.28	12.72	9-19	
0.075	425	7.5	94.74	5.26	3-8	

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